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SICKNESS FREQUENCY AMONG INDUSTRIAL EMPLOYEES.¹

DISEASE PREVALENCE AMONG WAGE-EARNERS DURING THE FIRST HALF OF THE
YEAR 1920.

In accordance with plans which the Public Health Service is developing with the aid of a committee of the American Public Health Association, for the collection, tabulation, and publication of information concerning the prevalence of disease among the wage-earning population,² the following tables are presented for the first half of the year 1920. The figures have been supplied by sick-benefit associations of the employees of certain plants which are cooperating with the Public Health Service by reporting currently the cases for which sick benefits were paid.

The tabulations herewith presented include those cases which caused disability for one week or longer; hence only the more serious illnesses are recorded. In subsequent publications the sickness reports from associations recording illnesses of shorter duration will be included. The present publication is intended as the first of a series of publications of industrial morbidity statistics which, it is hoped, will increase in volume, completeness, and accuracy.

Only a few of the associations have reported their morbidity experience for the entire six months' period. A number submitted their first report in May or June. Others which began to report earlier were unable at the time the figures were tabulated to submit complete statistics for the later months, owing to the unsettled status of some of their cases. For these reasons the statistics at the present time are not continuous for the entire period, and the changes in the associations considered from month to month made impracticable the computation of sickness frequency rates for the six months *combined*, though it is feasible to compute the rates for each month separately.

¹ From the Statistical Office, United States Public Health Service. The tables and graphs presented in this article were made under the immediate supervision of Assistant Statistician Dean K. Brundage.

² See "Sickness Records for Industrial Establishments," Reprint No. 573 from the Public Health Reports, November 14, 1919, pp. 2593-2604.

The number of persons considered is the number of employees reported as holding membership in the various associations during each month. While practically all of the reporting associations require a physician's certificate naming the ailment causing disability, the correct diagnosis probably is not always reported; but a fairly accurate idea of the more serious affections occurring among the working people whose disabilities have been reported is afforded by the number of cases and frequency rates shown in the following tables.

Disabling Sickness According to Month of Onset.

It will be noticed in Table I that the number of disability cases which started in January was 267 per 1,000 persons. This means that if cases of sickness which disable for at least a week should occur as often during the whole year as they did in January, the number of such cases by the end of the year would be 267 for every 1,000 persons under consideration. When it is considered that illness causing incapacity for less than a full week is not included in the tables herein presented, an extraordinarily high frequency of sickness is manifested. The majority of the members of most associations for sickness insurance, moreover, are men in the vigorous period of life—i. e., 13 of the 29 associations whose reports have been tabulated specify definite age limits for eligibility to membership, the average being from 17 to 55 years of age. In some other respects, too, industrial employees insured in sick-benefit associations are a distinctly selected group, as temporary or casual laborers are seldom admitted to membership, and some may be too poor to afford the cost of insurance. Women have not the privilege of belonging to some of the reporting associations, and in those reporting associations which do have female members their number is relatively small, so that the sickness rates presented could not be affected to any appreciable extent by the supposedly greater frequency of illness among women. Furthermore, not all diseases are included in the tabulations, as sick benefits are denied for the venereal diseases, and 8 of the 29 reporting associations in this group refuse to pay benefits for chronic diseases contracted prior to the date of joining the association. Eighteen of the associations do not pay for disabilities brought on by the use of intoxicating liquors; 13 decline to pay for disabilities resulting from the violation of any civil law; and 10 for the results of willful or gross negligence. Just how rigidly these rules are enforced is not known, but, considering these restrictions, the statistics should be regarded as a *minimum* statement of the disabilities actually occurring and lasting seven days or longer.

TABLE I.—*Frequency of cases of sickness causing disability for one week or longer among the members of sick-benefit associations in certain industrial establishments reporting to the Public Health Service: By month of onset, January to June, 1920.^a*

Month of onset.	Number of associations reporting.	Membership.	Cases reported.	Cases per 1,000 persons per year. ^b
1920.				
January.....	8	13, 818	312	267
February.....	11	21, 283	546	324
March.....	14	23, 196	262	133
April.....	15	24, 904	226	111
May.....	14	32, 035	256	94
June.....	14	40, 074	269	82

^a Including nonindustrial accidents, but not including the venereal diseases.

^b The annual frequency rate or case rate for a single month means the number of cases that would occur in a year among 1,000 persons if the rate at which new cases occurred during the month should continue throughout the year.

The marked seasonal variation in the occurrence of sickness from January to June is a conspicuous feature of Table I. The rate at which new cases occurred in February, for example, was approximately four times the incidence rate in June. It will be recalled that the recrudescence of epidemic influenza occurred in the first three months of this year, particularly in February, and in order to show the influence of the epidemic upon the seasonal variation in disease incidence, Figure 1 is presented. Cases diagnosed either as influenza or as grippé have been combined to represent the epidemic, because the terms are often used interchangeably in reporting the same disease. Figure 1 permits consideration of the incidence rates for influenza in relation to the rates for all other diseases, and shows the pronounced accentuation of the usual seasonal variation by the occurrence of the epidemic in the months in which sickness ordinarily is heavy.

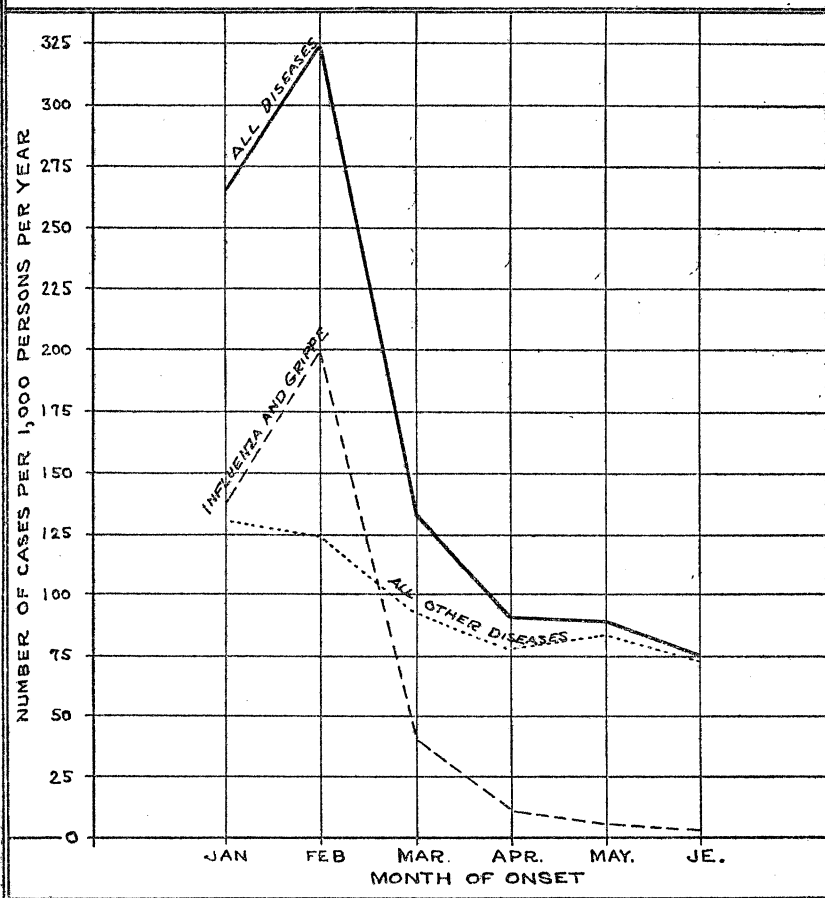
Frequency of Specific Diseases and Groups of Diseases.

In Table II are presented the number of cases of the more important diseases and groups of diseases occurring each month and the annual incidence rate per 1,000 persons considered.

It should be stated that the monthly fluctuations in the incidence of all diseases or of the more important specific diseases or of groups of diseases herein noted are indicated in a general way for each association.

FREQUENCY OF INFLUENZA AND GRIPPE COMPARED WITH THE FREQUENCY OF OTHER DISEASES, BY MONTH OF ONSET, JANUARY TO JUNE 1920.

ANNUAL NUMBER OF CASES PER 1,000 MEMBERS OF CERTAIN SICK-BENEFIT ASSOCIATIONS REPORTING TO THE PUBLIC HEALTH SERVICE.⁽¹⁾



⁽¹⁾ INCLUDES ONLY THOSE SICKNESS AND NON-INDUSTRIAL ACCIDENT CASES WHICH CAUSED ABSENCE FROM WORK FOR ONE WEEK OR MORE.

FIG. 1.

TABLE II.—Number of cases of sickness causing disability for one week or longer, and annual frequency rates per 1,000 members of sick-benefit associations in certain industrial establishments reporting to the Public Health Service: By month of onset, January to June, 1920, and by disease causing disability.

Disease or condition causing disability. (With corresponding title numbers in parentheses from the International List of the Causes of Death.)	Number of new cases.						Number of cases per 1,000 persons per year.					
	Jan.	Feb.	Mar.	Apr. (a)	May. (a)	June. (a)	Jan.	Feb.	Mar.	Apr. (a)	May. (a)	June. (a)
All diseases and conditions (1-189).....	312	546	262	155	211	223	266.6	323.8	133.3	91.5	89.7	76.1
General diseases (1-59)	183	363	113	56	53	60	156.4	215.2	57.5	33.1	22.5	20.5
Typhoid fever (1).....	2	.....	1	1	1	.....	1.7	.....	.5	.6	.4	.....
Influenza and grippe (10).....	159	338	79	21	14	9	135.8	200.4	40.2	12.4	5.9	3.1
Tuberculosis of the lungs (28, 29).....	4	2	5	2	3	8	3.4	1.2	2.5	1.2	1.3	2.7
Cancer (all forms) (39-46).....	.....	.....	1	2	1	.....	.....	.....	.5	1.2	.4	.....
Rheumatism (47, 48).....	8	11	13	16	22	23	6.8	6.5	6.6	9.4	9.3	7.8
Others (2-9, 11-27, 30-38, 49-59).....	10	12	14	14	12	20	8.5	7.1	7.1	8.3	5.1	6.8
Diseases of the nervous system (60-76).....	10	15	15	9	16	20	8.5	8.9	7.6	5.3	6.8	6.8
Neuralgia and neuritis (73).....	5	4	4	.....	3	4	4.3	2.4	2.0	.....	1.3	1.4
Cerebral hemorrhage, apoplexy, paralysis (64-66).....	1	.....	1	.....	1	.....	.9	.....	.5	.....	.4	.....
Mental alienation (insanity) (67, 68).....	1	2	3	1	.....	1	.9	1.2	1.5	.6	.....	.3
Others (60-63, 69-72, 74).....	3	4	6	4	7	9	2.5	2.4	3.1	2.4	3.0	3.1
Diseases of the eyes and annexa (75).....	.....	2	.....	4	2	5	.....	1.2	.....	2.4	.8	1.7
Diseases of the ears (76).....	.....	3	1	.....	3	1	.....	1.8	.5	.....	1.3	.3
Diseases of the circulatory system (77-85).....	3	7	10	6	15	9	2.6	4.2	5.1	3.5	6.4	3.1
Diseases of the heart (77-80).....	1	2	3	3	4	2	.9	1.2	1.5	1.8	1.7	.7
Diseases of the veins (83).....	1	4	5	2	5	5	.9	2.4	2.5	1.2	2.1	1.7
Others (81-82, 84-85).....	1	1	2	1	6	2	.9	.6	1.0	.6	2.5	.7
Diseases of the respiratory system (86-98).....	57	71	45	31	50	29	48.7	42.1	22.9	18.3	21.3	9.9
Bronchitis (89, 90).....	23	33	23	10	12	7	19.6	19.6	11.7	5.9	5.1	2.4
Pneumonia (all forms) (91, 92).....	19	22	7	10	25	9	16.2	13.0	3.6	5.9	10.6	3.1
Others (86-88, 93-98).....	15	16	15	11	13	13	12.8	9.5	7.6	6.5	5.5	4.4
Diseases of the digestive system (99-103, 105-118).....	28	23	48	22	41	44	23.9	22.5	24.4	13.0	17.4	15.0
Tonsillitis and other diseases of the pharynx (100).....	17	20	20	6	13	10	14.5	11.9	10.2	3.5	5.5	3.4
Diseases of the stomach (102, 103).....	5	9	13	6	9	9	4.3	5.3	6.6	3.5	3.8	3.1
Diarrhea and enteritis (105).....	2	2	4	.....	.....	2	1.7	1.2	2.0	.....	.....	.7
Appendicitis (108).....	4	4	5	5	6	11	3.4	2.4	2.5	3.0	2.5	3.8
Hernia (109).....	.....	2	1	5	8	6	.....	1.2	.5	3.0	3.4	2.0
Others (99, 101, 106-107, 110-118).....	.....	1	5	.....	5	6	.....	.6	2.5	.....	2.1	2.0
Diseases of the genito-urinary system and annexa (119-133).....	2	6	1	3	5	1	1.7	3.6	.5	1.8	2.1	.3
Acute nephritis and Bright's disease (119, 120).....	2	1	.....	.....	.....	.....	1.7	.6	.....	.....	.....	.....
Others (121-133).....	.....	5	1	3	5	1	.....	3.0	.5	1.8	2.1	.3
The puerperal state (134-141).....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Diseases of the skin and cellular tissue (142-145).....	6	14	6	4	8	11	5.1	8.3	3.1	2.4	3.4	3.8
Furuncle (143).....	1	8	1	2	4	7	.9	4.7	.5	1.2	1.7	2.4
Others (142, 144, 145).....	5	6	5	2	4	4	4.3	3.6	2.5	1.2	1.7	1.4

^a Totals for April, May, and June differ from those shown in Table I, because association H does not report diagnosis.

^b Except the venereal diseases.

^c Including organs of special sense (eyes, ears).

TABLE II.—Number of cases of sickness causing disability for one week or longer, etc.—Continued.

Diseases or condition causing disability. (With corresponding title numbers in parenthesis from the International List of the Causes of Death)	Number of new cases.						Number of cases per 1,000 persons per year.					
	Jan.	Feb.	Mar.	Apr.	May.	June.	Jan.	Feb.	Mar.	Apr.	May.	June.
Diseases of the bones and organs of locomotion (146-149).....	5	2	7	4	5	7	4.3	1.2	3.6	2.4	2.1	2.4
Diseases of the bones (146).....	1	1	.....	.....	1	1	.9	.6	.....	.....	.4	.3
Diseases of the joints (147).....	.....	.....	4	1	.....	1	.....	.....	2.0	.6	.....	.3
Others (including lumbago) (148, 149).....	4	1	3	3	4	5	3.4	.6	1.5	1.8	1.7	1.7
Senility (154).....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
External causes (155-186).....	4	17	6	17	10	29	3.4	10.1	3.1	10.0	4.3	9.9
Ill-defined diseases, and conditions (187-189).....	14	13	11	3	8	13	12.0	7.7	5.6	1.8	3.4	4.4
Number of members.....	13, 818	21, 283	23, 196	20, 661	27, 777	35, 766	.....	.....	.....	.....	.....	.....

The outstanding causes of disability are found in the general, the respiratory, and the digestive groups of diseases. For these three groups combined the rate ranged from 86 per cent of total sickness in February to 60 per cent of the rate for all diseases in June.

When influenza, grippe, and pulmonary tuberculosis are removed from the general diseases group, and added to the group designated as "Diseases of the respiratory system," as has been done in Table III and Figures 2 and 3, it becomes apparent that the rates for total respiratory diseases were greater than the rates for any other group, not only in January and February but in June as well. The respiratory affections are characterized from January to June by a tremendous seasonal fluctuation, and by a surprising prevalence, in comparison with other disease groups, in the first month of summer.

TABLE III.—Frequency of the principal groups of diseases. Number of cases of sickness causing disability for one week or longer per 1,000 persons per year among the membership of sick-benefit associations reporting to the Public Health Service: By month of onset January to June, 1920.

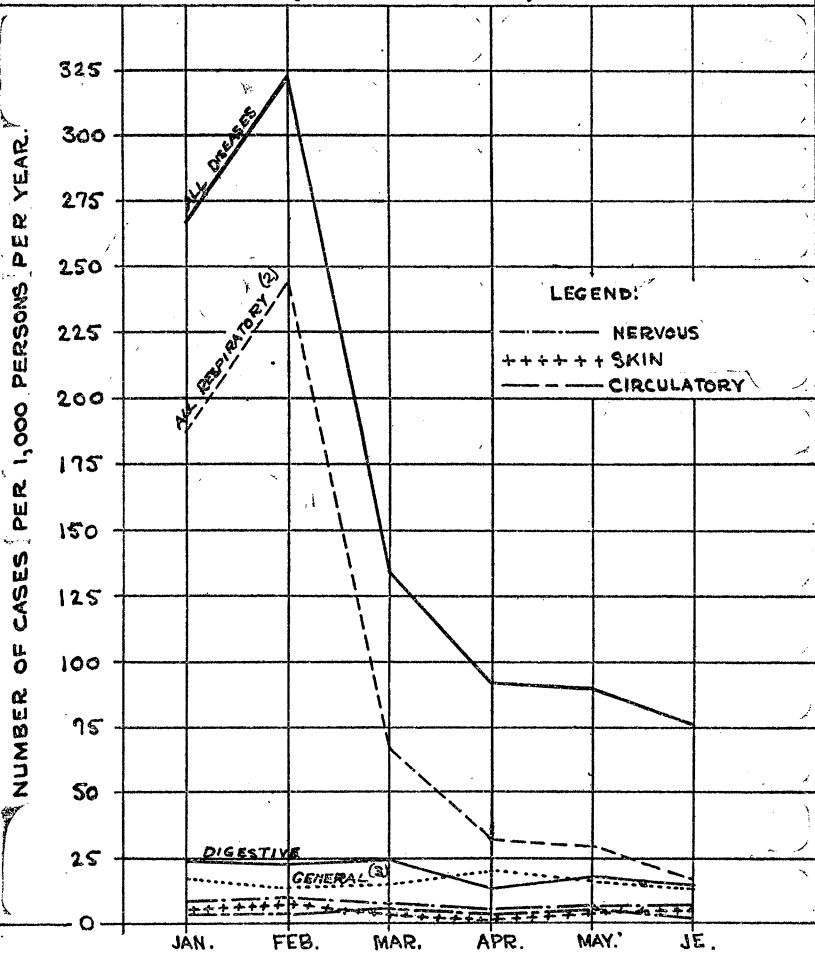
Disease or condition causing disability (with corresponding title numbers in parentheses from the International List of the Causes of Death).	Jan.	Feb.	Mar.	Apr.	May.	June.
All diseases and conditions (1-189) ^a	266.6	323.8	133.3	91.5	89.7	76.1
All respiratory diseases (10, 28, 29, 86-98) ^b	187.9	243.7	65.6	31.9	28.5	15.7
General diseases (1-9, 11-27, 30-59) ^c	17.2	13.6	14.8	19.5	15.3	14.7
Diseases of the nervous system (60-76).....	8.5	8.9	7.6	5.3	6.8	6.8
Diseases of the circulatory system (77-85).....	2.6	4.2	5.1	3.5	6.4	3.1
Diseases of the digestive system (99-103, 105-118).....	23.9	22.5	24.4	13.0	17.4	15.0
Diseases of the genito-urinary system (119-133).....	1.7	3.6	.5	1.8	2.1	.3
Diseases of the skin and cellular tissue (142-145).....	5.1	8.3	3.1	2.4	3.4	3.8
Diseases of the bones and organs of locomotion (146-149).....	4.3	1.2	3.6	2.4	2.1	2.4
External causes (155-186).....	3.4	10.1	3.1	10.0	4.3	9.9
Ill-defined diseases and conditions (187-189).....	12.0	7.7	5.6	1.8	3.4	4.4

^a Except the venereal diseases.

^b Including influenza, grippe, and tuberculosis of the lungs (10, 28, and 29).

^c Exclusive of influenza, grippe, and tuberculosis of the lungs (10, 28, and 29).

FREQUENCY OF THE PRINCIPAL GROUPS OF DISEASES.
NUMBER OF CASES PER 1,000 PERSONS PER YEAR AMONG THE
MEMBERSHIP OF SICK-BENEFIT ASSOCIATIONS REPORTING TO
THE PUBLIC HEALTH SERVICE:⁽¹⁾ BY MONTH OF ONSET,
JANUARY TO JUNE 1920.⁷
(NATURAL SCALE).



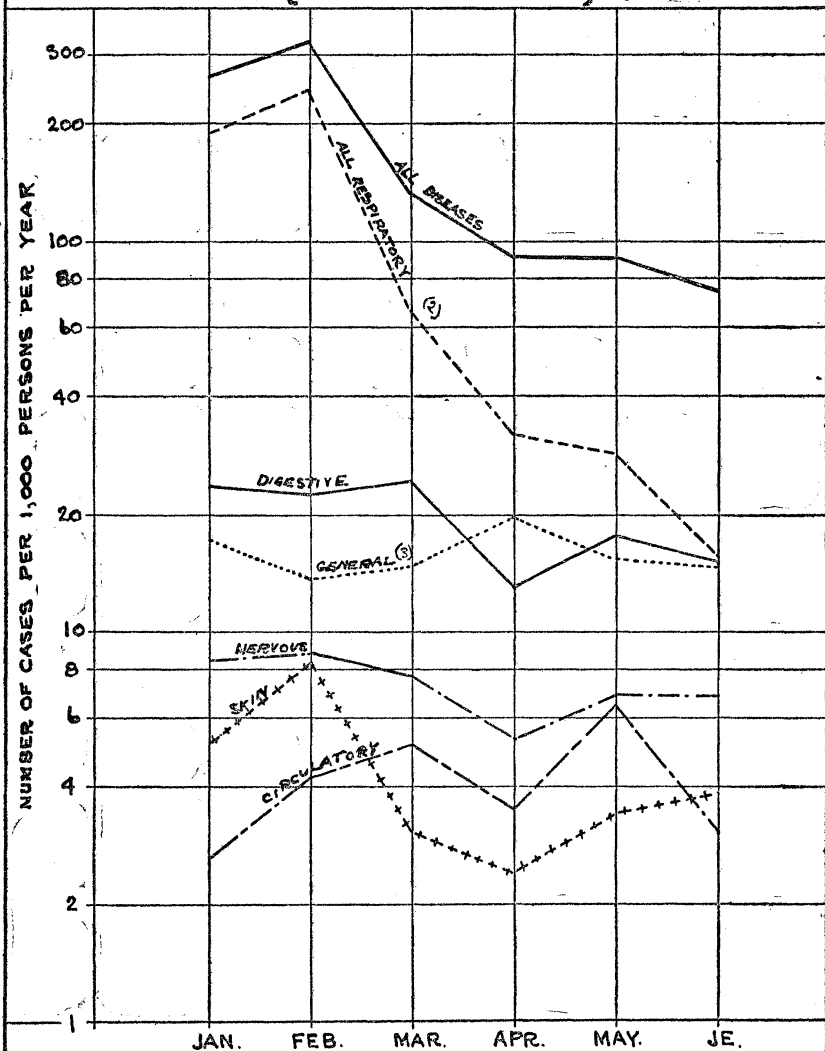
(1) INCLUDES ONLY THOSE SICKNESS AND NON-INDUSTRIAL ACCIDENTS CASES WHICH CAUSED ABSENCE FROM WORK FOR ONE WEEK OR MORE.

(2) INCLUDING INFLUENZA, LA GRIPPE, AND TUBERCULOSIS OF THE LUNGS.

(3) EXCLUSIVE OF INFLUENZA, LA GRIPPE, AND TUBERCULOSIS OF THE LUNGS.

FIG. 2.

FREQUENCY OF THE PRINCIPAL GROUPS OF DISEASES.
NUMBER OF CASES PER 1,000 PERSONS PER YEAR AMONG THE
MEMBERSHIP OF SICK-BENEFIT ASSOCIATIONS REPORTING TO
THE PUBLIC HEALTH SERVICE. (1) BY MONTH OF ONSET,
JANUARY TO JUNE 1920.
(LOGARITHMIC SCALE).



(1) INCLUDES ONLY THOSE SICKNESS AND NON-INDUSTRIAL ACCIDENTS CASES WHICH CAUSED ABSENCE FROM WORK FOR ONE WEEK OR MORE.

(2) INCLUDING INFLUENZA, LA GRIPPE, AND TUBERCULOSIS OF THE LUNGS.

(3) EXCLUSIVE OF INFLUENZA, LA GRIPPE, AND TUBERCULOSIS OF THE LUNGS.

FIG. 3.

In Figure 3 the incidence of the several groups of diseases are plotted on a logarithmic scale for the purpose of showing the relative variations rather than the actual variations.³ It will be noted that the digestive diseases were the second most prevalent group among the persons under consideration during the six months' period. The slight seasonal fluctuation may be accounted for by the fact that tonsillitis, which occurs mostly in winter weather, is included in this group in accordance with the International List of the Causes of Death.

The general diseases in every month except April were slightly less frequent than the digestive troubles. They include those affections listed under this title in the International List of the Causes of Death, with the exception of influenza, grippe, and tuberculosis of the lungs, which have been added to the respiratory group as mentioned above. Among the more common diseases in the general group are rheumatism, cancer, diabetes, goiter, anemia, erysipelas, small-pox, and other epidemic diseases.

The rates for the other disease groups are lower than those for the three that have been mentioned, and they fail to exhibit any very marked seasonal tendencies.

Referring to the frequency rates for specific diseases exhibited in Table II, the most outstanding feature is, of course, the incidence of epidemic influenza. Next to influenza and grippe the most prevalent diseases were bronchitis, pneumonia, and diseases of the pharynx (principally tonsillitis); and their frequency fluctuated from month to month in fairly similar fashion. It is interesting to observe the behavior of rheumatism, which occurred oftener in June than in the winter months, the incidence rate in June being fairly high for all large reporting establishments. Rheumatism was most prevalent in April and May.

Less frequent than the particular diseases just mentioned were the stomach troubles, appendicitis, neuralgia and neuritis, and tuberculosis of the lungs. For new cases of tuberculosis the rate varied between one and three per 1,000 persons per year, which seems to indicate a relatively slight disability from tuberculosis lasting seven days or longer. It may be offered in explanation that many cases which actually began in the period under consideration probably had not yet reached a stage involving actual incapacity for work.

³ The reader is referred to the following recent discussions of the use of the logarithmic scale in graphic presentation: Whipple, G. W., *Vital Statistics* (1919), pp. 83-87; Fisher, Irving, *The Ratio Chart*: Quarterly Publication of the American Statistical Association, 1917, p. 577; Field, J. A., *Some Advantages of the Logarithmic Scale in Statistical Diagrams*: *Journal of Political Economy*, XXV, 8, October, 1917.

Sickness Rates for the Reporting Sick-Benefit Associations.

The frequency of sickness which caused absence from work for one week or longer in the reporting associations is shown in Table IV. The associations have been classified according to size—those having more than 3,000 members appearing in Group I and those with less than that number in Group II—to facilitate observation of the rates for the large and for the small industrial establishments.

TABLE IV.—*Number of cases of sickness and case rates for all reporting sick-benefit associations, and for each reporting association having more than 500 members,^a by months, January to June, 1920.*

[Where blank spaces appear, the statistics were not available.]

Sick-benefit associations.	Average membership.	Number of cases in—						Number of cases per 1,000 persons per year.					
		Jan.	Feb.	Mar.	Apr.	May.	June.	Jan.	Feb.	Mar.	Apr.	May.	June.
All reporting associations.....	25,885	312	546	262	226	256	269	267	324	133	111	94	82
Group I ^b	21,563	258	406	180	157	185	237	267	283	118	99	82	81
A.....	8,485	123	79	43	26			171	118	60	37		
B.....	2,910	135	181	62				546	784	252			
C.....	6,678		146	75	60				276	133	110		
D.....	4,133					38	33					108	98
E.....	18,481					102	80					66	53
F.....	3,061						20						80
G.....	5,577						58						127
H.....	4,270				71	45	46				204	125	130
Group II ^d	4,322	54	140	82	69	71	32	264	551	189	153	160	88
N.....	874	20	45	13	5	13	5	270	649	175	70	176	70
O.....	552		19	4	8	2	1		461	83	174	43	22
P.....	640			12	8	11	8			219	151	203	156
Q.....	695	19	39	9	9	8		327	719	152	157	135	
R.....	1,128			9	5	11	8			96	55	115	84
Others ^e	1,230	15	37	35	34	26	10	207	414	336	259	227	101

^a Includes only those sickness and nonindustrial accident cases which caused absence from work for one week or longer.

^b Associations which have more than 3,000 members.

^c Included with the large associations because the membership is nearly 3,000.

^d Associations which have less than 3,000 members.

^e Associations which have less than 500 members.

It will be noticed at once how large the fluctuation in disease incidence was from month to month in accordance with expected seasonal variation for all establishments. What are perhaps more important are the wide differences among reporting establishments in the same month. In February, for instance, the frequency rate for association B was nearly seven times as great as the rate for association A, and in April, association H had nearly six times as much sickness as establishment A. It may be observed that similar differences appear in the rates among the smaller associations. These marked differences afford strong reasons for a careful study not only of the causes of illness in the different plants, but of the conditions which give rise to them. While it is not the purpose to analyze these differences at this time, since the records for the different associations are not sufficiently comparable with respect to the period covered, the value

of statistics of this nature will, it is believed, become more and more manifested as they accumulate. In later publications it is hoped to present more detailed analyses.

Cooperation Invited.

The tables herein presented represent merely a beginning in the publication of industrial morbidity statistics. It is intended to extend the collection of sickness statistics to as many plants as will cooperate by furnishing reports periodically. While the number of reporting associations has been considerably augmented of late, it is hoped that more establishments will report the disabilities occurring among their employees.

ACKNOWLEDGMENTS.

Acknowledgments are made to those corporation managers and association secretaries whose generous assistance has made possible the inauguration of the present plan to obtain current information of the incidence of disease among the wage-earning population.

RECENT EXPERIMENTS IN THE CONTROL OF AIR DUSTINESS.¹

By O. M. SPENCER, Passed Assistant Surgeon (R.), United States Public Health Service.

We may assume as generally accepted that tuberculosis never appears unless the tubercle bacilli are present, and that even when such bacilli are present, tuberculosis does not develop unless they are in sufficient numbers to overthrow normal resistance or unless they find in the ultimate victim a physical condition sufficiently subnormal to predispose him to their virulent assaults. Factors that may so predispose an individual vary. Perhaps they may be due to the virulence of the tubercle bacilli, to racial stock, or to emaciation resulting from various causes, such as deterioration caused by alcohol, or from fatigue, or like factors within the individual; or they may come from more remote factors that influence or tend to develop physical disabilities, such as poor ventilation, exposure to extremes of heat and cold, wet processes, inadequate lighting, bad housing, low standards of living, insanitary community conditions, or unhealthy climatic conditions.

Because there are these ramifications of the influencing factors of tuberculosis, a restriction in the scope of this subject may not be out of harmony with the general program. I am, therefore, taking the liberty to discuss the results of some recent studies made by

¹ Read at the North Atlantic Tuberculosis Conference held at Richmond, Va., Oct. 7-8, 1920.